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PATENT ABSTRACTS OF JAPAN

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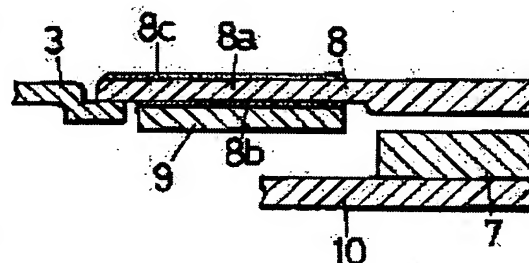
(72)Inventor : NARUTOMI MASANORI

(54) PORTABLE COMMUNICATION EQUIPMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a portable communication equipment that improves a sounding effect, effectively utilizes a space and realizes a low cost.

SOLUTION: The portable communication equipment of this invention is a communication equipment the case of which has a function of displaying operation contents of the equipment and a sound transmission function. The communication equipment comprises a liquid crystal display element 7 that is built in the case 3 and has a display function, a transparent plate 8 placed on the front side of the case 3, covers the liquid crystal display element 7 and through which display contents can be viewed, and a piezoelectric vibration element 9 placed to an inner end of the case 3 of the transparent plate 8 adjacent to the liquid crystal display element 7 and having a sound transmission function.



LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] The portable communication equipment carry out becoming from the transparence plate which is the portable communication equipment which has the function which displays the contents of actuation of a device, and the function which carry out voice dispatch, covers the display device which is arranged at the case of said communication equipment and has a display function, and the part in the front face of said case by which said display device is arranged, and can view the contents of a display, and the piezo-electric oscillating component which said display device adjoins, it be prepared in the rear face of this transparence plate, and it has in a voice dispatch function as the description.

[Claim 2] Portable communication equipment characterized by preparing oscillating space between said transparence plate and a piezo-electric oscillating component in portable communication equipment according to claim 1.

[Claim 3] Portable communication equipment characterized by preparing two or more piezo-electric oscillating components in said transparence plate in portable communication equipment according to claim 1.

[Claim 4] Portable communication equipment which uses said some of transparence plates as thin meat, and is characterized by having arranged said piezo-electric oscillating component into the part of this thin meat in portable communication equipment according to claim 1.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to movable portable communication equipment like portable telephone, home telephone, and a mobile computer. It is related with the portable communication equipment which has the function which carries out voice dispatch especially.

[0002]

[Description of the Prior Art] As for the components built in these devices, low cost-ization is demanded with the spread of a computer related equipment in recent years and communication equipment. In connection with this, various functions and the sex from Takao are also demanded with highly precise-ization of electronic parts. Moreover, the product which has a liquid crystal display function becomes in use so that portable telephone may see, and many alphabetic characters and image information are displayed recently. For this reason, what has it is desired, and the rate of occupying to a device is large. [where a liquid crystal display side is large and it is legible]

[0003] However, since it was telephone, there was a limitation in having to arrange a telephone transmitter and an earphone (receiver) and extending a drop. When a piezo-electric oscillating component is made small, for example, or a configuration is changed and being built, the function of a piezo-electric oscillating component is affected, and it becomes the bad earphone of tone quality, and is a problem. the proposal which arranges piezo-electric oscillating objects, such as a mono-morph mold, a laminating mold, a bimorph mold, or a multi-morph mold, at the rear face of the wall surface of a case is also made — **** (JP,09-331384,A) — when a liquid crystal display component is prepared and it applies, installation becomes the location distant from the liquid crystal display screen, and has the function top problem of tone quality. Therefore, that to which both a liquid crystal display function and the function of an earphone (receiver) are satisfied with sufficient balance was demanded.

[0004]

[Problem(s) to be Solved by the Invention] This invention was made based on such a technological background, and attains the following purpose. The purpose of this invention is to offer the portable communication equipment arranged suitable for a case, in order to improve the sound effect of a piezo-electric oscillating component. Other purposes of this invention aim at a deployment of a tooth space, and are to offer the portable communication equipment which realized low cost.

[0005]

[Means for Solving the Problem] The following means are taken in order to solve said technical problem. The display device which the portable communication equipment of this invention is portable communication equipment which has the function which displays the contents of actuation of a device, and the function which carries out voice dispatch, and is arranged at the case of said communication equipment and has a display function, It is characterized by consisting of a transparence plate which covers the part in the front face of said case by which said display device is arranged, and can view the contents of a display, and a piezo-electric oscillating component which adjoins said display device, is prepared in the rear face of this

transparence plate, and has a voice dispatch function. Said display has desirable flat-surface types, such as various kinds of liquid crystal displays and a plasma display.

[0006] Moreover, in order to improve an oscillation characteristic between said transparence plate and a piezo-electric oscillating component, you may make it prepare oscillating space. When it does in this way, there is loudspeaker (loudspeaker) effectiveness. Furthermore, you may make it prepare two or more piezo-electric oscillating components in said transparence plate. In this case, stereo effect is possible. Furthermore, frequency characteristics may be improved, if said some of transparence plates are used as thin meat and said piezo-electric oscillating component is arranged into the part of this thin meat.

[0007]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained. What is shown in drawing 1 is the front view of the portable telephone which applied this invention. The portable telephone 1 consists of nothing and a body 2 of telephone made of synthetic resin in the thin abbreviation rectangle, and the interior of the electronic equipment, such as IC which realizes the function of a telephone, is carried out into this body 2 of telephone. The body 2 of telephone consists of two bodies, and is carried out 2 ****s by the parting plane of the core of the thickness direction.

[0008] The case covering 3 is arranged on the top face of the body 2 of telephone, and the rear-face body 4 is arranged in this rear face. The function of a control panel and the function as a body 2 of telephone achieve both, two or more push-buttons 5 are arranged under this case covering 3, and the case covering 3 constitutes a key group. The frame of this case covering 3 is a metal frame currently made from the magnesium alloy etc. This metal frame has the effectiveness which intercepts efficiently the electromagnetic wave from the electromagnetic wave generated from electronic parts, such as 1C, or other electronic equipment, and is often used recently.

[0009] A push-button 5 gives the command for driving the contacts (not shown) arranged in the body 2 of telephone. Moreover, the rectangle-like window part 6 is formed above the case covering 3, the liquid crystal display component 7 is built in in the direction of the interior of this window part 6, and the transparence plate 8 is formed in that upper part. This transparence plate 8 is formed so that the window part 6 whole may be covered in piles to the case covering 3 along the edge of a window part 6. By considering as the plate of transparence, the contents of a display of the liquid crystal display component 7 can view from the outside.

[0010] The liquid crystal display component 7 is well-known, and has a color or a monochrome display function. The transparence plate 8 has covered the upper part of the liquid crystal display component 7, and is extending it to the upper limit (antenna side) of the case covering 3 further. The transparence plate 8 is made with a polycarbonate resin plate or an acrylic resin plate.

[0011] The piezo-electric oscillating component 9 is attached in the rear face of the upper transparence plate 8 from the part by which the liquid crystal display component 7 has been arranged. This piezo-electric oscillating component 9 is explained to a detail later. the portable telephone 1 -- an outline -- it has such composition and the case covering 3 and the rear-face body 4 are being fixed to one with fixed means (not shown), such as a screw or a notch.

[0012] Drawing 2 is the sectional view having shown partially the part of the liquid crystal display component 7, and the part of the piezo-electric oscillating component 9. The liquid crystal display component 7 is attached in the circuit board 10 built in the case covering 3. Although the contents of a display of the liquid crystal display component 7 are displayed on the front face of this liquid crystal display component 7, those contents of a display can be viewed through the transparence plate 8 as above-mentioned. Moreover, the liquid crystal display component 7 is adjoined and the piezo-electric oscillating component 9 is attached in the edge rear face of the extended transparence plate 8, as drawing 2 shows.

[0013] Drawing 3 showed this further to the detail. The piezoelectric crystal 11 is being used for the piezo-electric oscillating component 9 as a piezo-electric oscillating object. The piezo-electric oscillating component 9 is called the mono-morph mold, the laminating mold, the bimorph mold, or the multi-morph mold, and consists of piezoelectric crystal 11 grade which shows the

piezo-electric effect. This piezo-electric oscillating component 9 is a component for which two electrodes 12 and 13 which counter a piezo electric crystal are formed, use for a piezo-electric distortion produced by impressing an electrical potential difference between these two electrodes 12 and 13, and a mechanical vibration is made to exercise.

[0014] However, the piezo-electric oscillating component 9 used with the gestalt of this operation does not have the diaphragm. Since it is formed in thin meat and, as for edge 8a of the transparence plate 8, the piezo-electric oscillating component 9 is directly stuck on this rear-face 8b from other parts, a diaphragm does not not necessarily have the need with sufficient frequency characteristics. paint 8c Moreover, you may make it the front face of edge 8a of the transparence plate 8 for an ornament. The piezo-electric oscillating component 9 of the transparence plate 8 stuck on rear-face 8b for transparence can space and be seen. In order to prevent this and to raise the feeling of beauty of the portable telephone 1, paint 8c may be given to a front face.

[0015] Silver soldering from which the field of another side where silver soldering from which one field of a piezoelectric crystal 11 serves as an electrode 12 is made, and the piezo-electric oscillating component 9 shown in drawing hits the rear face of this piezoelectric crystal 11 also serves as an electrode 13 is made. This silver soldering is the shape of thin film. Lead wire 14 and 15 is connected to these two electrodes 12 and 13, respectively, if the electrical potential difference of a sound signal is impressed between two electrodes 12 and 13 -- a piezoelectric crystal 11 -- crookedness -- lifting voice is uttered for a variation rate.

[0016] Although this component is generally stuck by the diaphragm in the shape of [thin] film through adhesives and this stuck thing is attached in case covering etc., the configuration of this invention is sticking the piezo-electric oscillating component 9 on the transparence plate 8 through adhesives 16. Consequently, since the transparence plate 8 turns into a diaphragm and utters voice, the voice effectiveness is good.

[0017] That is, since a large compass area can be taken compared with an oscillating object when the transparence plate 8 is general, broad voice including a bass region can be obtained. Thus, by having made the piezo-electric oscillating component 9 the configuration attached in the direct transparence plate 8, while heightening the voice effectiveness, an assembly is simplified, and it becomes man day reduction and becomes low cost from on manufacture.

[0018] In case drawing 4 sticks the piezo-electric oscillating component 9 on the transparence plate 8, it is the thing of a configuration of having attached the bridge wall 17 between the transparence plates 8, and having formed the space section 18 in it. This configuration forms the space section 18 through a bridge wall 17 between the piezo-electric oscillating component 9 and the transparence plate 8. A perimeter is surrounded and, as for the bridge wall 17, the transparence plate 8 is pasted [which it became annular] up with adhesives 19 the piezo-electric oscillating component 9 side. The sound from the piezo-electric oscillating component 9 sounds the transparence plate 8 through this space section 18, and is much more effective.

[0019] Moreover, the sound is made easy to form the sound emission hole 20 in the transparence plate 8, and to catch. If a lug is applied and asked to the transparence plate 8, as long as it will hear it by the damper effectiveness and will take ***** fear into consideration, the piezo-electric oscillating component 9 which has a diaphragm may be attached. Since it is possible to be able to make low the frequency which resonates by forming the space section 18, and to control a loud-sound region side, there is effectiveness which becomes easy to hear it. However, it is not necessary to necessarily arrange the sound emission hole 20.

[0020] Drawing 5 is the example which formed two piezo-electric oscillating components 21. Multi-functionalization of the portable telephone 1 also enables it to listen to music by the portable telephone 1 with the spread of the Internet recently. Although a stereo sound is an ideal in the semantics which heightens the sound effect, it is possible by forming two piezo-electric oscillating components 21 in independent. Two piezo-electric oscillating components 21 which generate a sound in independent are arranged in parallel and attached in the background of the transparence plate 22.

[0021] Corresponding to the location of two piezo-electric oscillating components 21, the sound emission hole 23 is formed in the transparence plate 22. If a lug is applied to this sound emission

hole 23, the sound of different compass can be asked to coincidence. Moreover, if it constitutes so that an earphone may be attached in the portable telephone 1 (not shown) and is heard through this earphone when hearing it with both lugs, it is possible for it to be the same with hearing a stereo sound with radio etc.

[0022] When there are many functional parts, it is attached and a tooth space is restricted like the cellular-phone machine of a liquid crystal form, application of this invention is effective. It is possible to attach in a narrow tooth space according to the configuration of the case of a cellular-phone machine. Thus, loud pronunciation is attained by constituting.

[0023] Thus, since this invention can respond to various product gestalten, it cannot be overemphasized that it is not limited to the configuration explained above and is applied to other examples. For example, the configuration of the piezo-electric sounding body and the configuration of a transparence plate may be the things of not only the shape of a rectangle but a circle configuration, and are not limited to the configuration.

[0024]

[Effect of the Invention] As a full account was given above, by applying this invention, the voice effectiveness of a piezo-electric oscillating component was able to become good, the deployment of a tooth space was able to be aimed at, and low cost was able to be realized.

[Translation done.]

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TECHNICAL FIELD

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PRIOR ART

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[0003] However, since it was telephone, there was a limitation in having to arrange a telephone transmitter and an earphone (receiver) and extending a drop. When a piezo-electric oscillating component is made small, for example, or a configuration is changed and being built, the function of a piezo-electric oscillating component is affected, and it becomes the bad earphone of tone quality, and is a problem. the proposal which arranges piezo-electric oscillating objects, such as a mono-morph mold, a laminating mold, a bimorph mold, or a multi-morph mold, at the rear face of the wall surface of a case is also made -- **** (JP,09-331384,A) -- when a liquid crystal display component is prepared and it applies, installation becomes the location distant from the liquid crystal display screen, and has the function top problem of tone quality. Therefore, that to which both a liquid crystal display function and the function of an earphone (receiver) are satisfied with sufficient balance was demanded.

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

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MEANS

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[0006] Moreover, in order to improve an oscillation characteristic between said transparence plate and a piezo-electric oscillating component, you may make it prepare oscillating space. When it does in this way, there is loudspeaker (loudspeaker) effectiveness. Furthermore, you may make it prepare two or more piezo-electric oscillating components in said transparence plate. In this case, stereo effect is possible. Furthermore, frequency characteristics may be improved, if said some of transparence plates are used as thin meat and said piezo-electric oscillating component is arranged into the part of this thin meat.

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[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained. What is shown in drawing 1 is the front view of the portable telephone which applied this invention. The portable telephone 1 consists of nothing and a body 2 of telephone made of synthetic resin in the thin abbreviation rectangle, and the interior of the electronic equipment, such as IC which realizes the function of a telephone, is carried out into this body 2 of telephone. The body 2 of telephone consists of two bodies, and is carried out 2 ****s by the parting plane of the core of the thickness direction.

[0008] The case covering 3 is arranged on the top face of the body 2 of telephone, and the rear-face body 4 is arranged in this rear face. The function of a control panel and the function as a body 2 of telephone achieve both, two or more push-buttons 5 are arranged under this case covering 3, and the case covering 3 constitutes a key group. The frame of this case covering 3 is a metal frame currently made from the magnesium alloy etc. This metal frame has the effectiveness which intercepts efficiently the electromagnetic wave from the electromagnetic wave generated from electronic parts, such as IC, or other electronic equipment, and is often used recently.

[0009] A push-button 5 gives the command for driving the contacts (not shown) arranged in the body 2 of telephone. Moreover, the rectangle-like window part 6 is formed above the case covering 3, the liquid crystal display component 7 is built in in the direction of the interior of this window part 6, and the transparence plate 8 is formed in that upper part. This transparence plate 8 is formed so that the window part 6 whole may be covered in piles to the case covering 3 along the edge of a window part 6. By considering as the plate of transparence, the contents of a display of the liquid crystal display component 7 can view from the outside.

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[0014] However, the piezo-electric oscillating component 9 used with the gestalt of this operation does not have the diaphragm. Since it is formed in thin meat and, as for edge 8a of the transparence plate 8, the piezo-electric oscillating component 9 is directly stuck on this rear-face 8b from other parts, a diaphragm does not not necessarily have the need with sufficient frequency characteristics. paint 8c Moreover, you may make it the front face of edge 8a of the transparence plate 8 for an ornament. The piezo-electric oscillating component 9 of the transparence plate 8 stuck on rear-face 8b for transparence can space and be seen. In order to prevent this and to raise the feeling of beauty of the portable telephone 1, paint 8c may be given to a front face.

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space section 18 through a bridge wall 17 between the piezo-electric oscillating component 9 and the transparence plate 8. A perimeter is surrounded and, as for the bridge wall 17, the transparence plate 8 is pasted [which it became annular] up with adhesives 19 the piezo-electric oscillating component 9 side. The sound from the piezo-electric oscillating component 9 sounds the transparence plate 8 through this space section 18, and is much more effective.

[0019] Moreover, the sound is made easy to form the sound emission hole 20 in the transparence plate 8, and to catch. If a lug is applied and asked to the transparence plate 8, as long as it will hear it by the damper effectiveness and will take ***** fear into consideration, the piezo-electric oscillating component 9 which has a diaphragm may be attached. Since it is possible to be able to make low the frequency which resonates by forming the space section 18, and to control a loud-sound region side, there is effectiveness which becomes easy to hear it. However, it is not necessary to necessarily arrange the sound emission hole 20.

[0020] Drawing 5 is the example which formed two piezo-electric oscillating components 21. Multi-functionalization of the portable telephone 1 also enables it to listen to music by the portable telephone 1 with the spread of the Internet recently. Although a stereo sound is an ideal in the semantics which heightens the sound effect, it is possible by forming two piezo-electric oscillating components 21 in independent. Two piezo-electric oscillating components 21 which generate a sound in independent are arranged in parallel and attached in the background of the transparence plate 22.

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[0022] When there are many functional parts, it is attached and a tooth space is restricted like the cellular-phone machine of a liquid crystal form, application of this invention is effective. It is possible to attach in a narrow tooth space according to the configuration of the case of a cellular-phone machine. Thus, loud pronunciation is attained by constituting.

[0023] Thus, since this invention can respond to various product gestalten, it cannot be overemphasized that it is not limited to the configuration explained above and is applied to other examples. For example, the configuration of the piezo-electric sounding body and the configuration of a transparence plate may be the things of not only the shape of a rectangle but a circle configuration, and are not limited to the configuration.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the front view of the cellular-phone machine which applied this invention.

[Drawing 2] Drawing 2 is the fragmentary sectional view showing having attached the piezo-electric oscillating component in the background of a transparence plate.

[Drawing 3] Drawing 3 is the detail drawing of drawing 2.

[Drawing 4] Drawing 4 is the sectional view having shown the example of the piezo-electric oscillating component installation which prepared the space section between the piezo-electric oscillating component and the transparence plate.

[Drawing 5] Drawing 5 is the front view of the cellular-phone machine which prepared two piezo-electric oscillating components.

[Description of Notations]

- 1 -- Cellular-phone machine
- 3 -- Case covering
- 6 -- Window part
- 7 -- Liquid crystal display component
- 8 22 -- Transparence plate
- 9 21 -- Piezo-electric oscillating component
- 18 -- Space section
- 20 23 -- Sound emission hole

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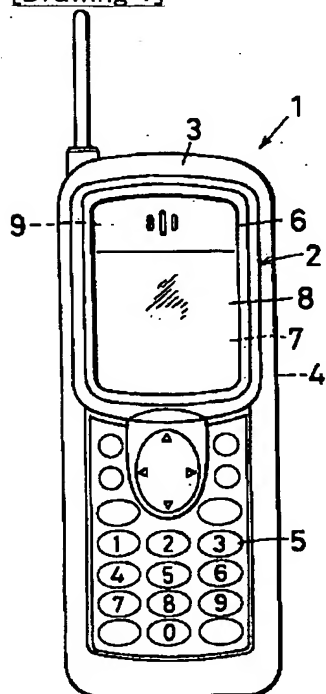
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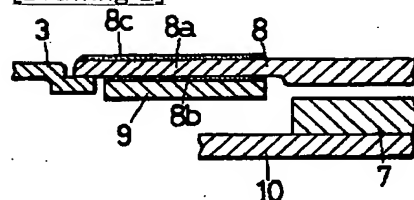
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DRAWINGS

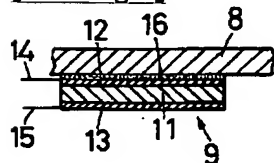
[Drawing 1]



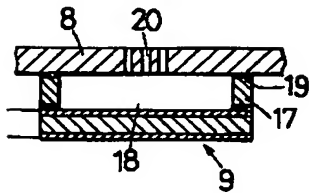
[Drawing 2]



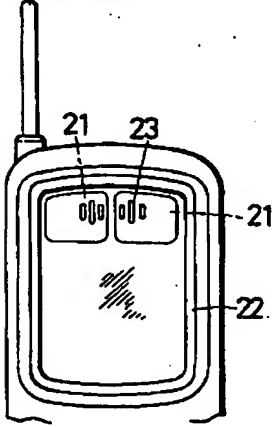
[Drawing 3]



[Drawing 4]



[Drawing 5]



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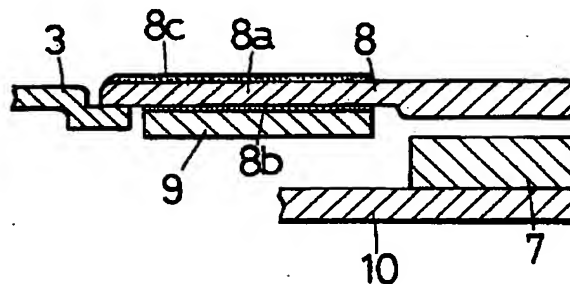
5K023 AA07 BB03 BB04 EE07

(54) 【発明の名称】 携帯用通信機器

(57) 【要約】

【課題】 発音効果をよくし、スペースの有効利用を図り、低コストを実現した携帯用通信機器の提供。

【解決手段】 本発明の携帯用通信機器は、ケースに機器の操作内容を表示する機能と音声発信機能を有する携帯用の通信機器である。ケース3に内蔵され表示機能を有する液晶表示素子7と、ケース3の表面にあって液晶表示素子7を覆い表示内容が目視できる透明板8と、この透明板8のケース3内端部に液晶表示素子7に隣接して設けられ音声発信機能を有する圧電振動素子9とからなっている。



【特許請求の範囲】

【請求項 1】機器の操作内容を表示する機能と音声発信する機能を有する携帯用の通信機器であって、前記通信機器のケースに配置され表示機能を有する表示素子と、前記ケースの表面にあって前記表示素子が配置されている部分を覆い表示内容が目視できる透明板と、この透明板の裏面に前記表示素子に隣接して設けられ音声発信機能を有する圧電振動素子とからなることを特徴とする携帯用通信機器。

【請求項 2】請求項 1 に記載の携帯用通信機器において、前記透明板と圧電振動素子との間に振動空間を設けるようにしたことを特徴とする携帯用通信機器。

【請求項 3】請求項 1 に記載の携帯用通信機器において、前記透明板に複数の圧電振動素子を設けるようにしたことを特徴とする携帯用通信機器。

【請求項 4】請求項 1 に記載の携帯用通信機器において、前記透明板の一部を薄肉にして、この薄肉の部分に前記圧電振動素子を配置したことを特徴とする携帯用通信機器。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、携帯用電話機、ホームテレホン、モバイルコンピュータ等のように移動可能な携帯用通信機器に関する。特に、音声発信する機能を有する携帯用の通信機器に関する。

【0002】

【従来の技術】近年のコンピュータ関連機器、通信機器の普及に伴い、これらの機器に内蔵される部品は、低コスト化が要請されている。これに伴い、電子部品の高精度化とともに、多機能、高生産性も要求されている。また、最近では携帯用電話器に見られるように液晶表示機能を有する製品が主流となり、多数の文字、画像情報が表示されるようになってきている。このため、液晶表示面は大きく見やすいものが望まれ、機器に占める割合が大きくなっている。

【0003】しかし、電話器であるので送話器と受話器（レシーバー）を配置しなければならず表示器を拡張するには限界があった。圧電振動素子を例えば小さくしたり、形状を変えたりして内蔵すると、圧電振動素子の機能に影響を及ぼし、音質の悪い受話器になってしまい問題である。ケースの壁面の裏面にモノモルフ型、積層型、バイモルフ型またはマルチモルフ型等の圧電振動体を配置する提案もされている（特開平 09-331384 号公報）が、液晶表示素子の設けられた場合に適用すると、取り付けは液晶表示画面から離れた位置になり、音質の機能上問題がある。従って、液晶表示機能、受話

器（レシーバー）の機能の両方をバランスよく満足させるものが要望されていた。

【0004】

【発明が解決しようとする課題】本発明は、このような技術的背景に基づいてなされたもので、下記の目的を達成するものである。本発明の目的は、圧電振動素子の音響効果をよくするためにケースに好適に配置された携帯用通信機器を提供することにある。本発明の他の目的は、スペースの有効利用を図り、低コストを実現した携帯用通信機器を提供することにある。

【0005】

【課題を解決するための手段】前記課題を解決するために次のような手段を採る。本発明の携帯用通信機器は、機器の操作内容を表示する機能と音声発信する機能を有する携帯用の通信機器であって、前記通信機器のケースに配置され表示機能を有する表示素子と、前記ケースの表面にあって前記表示素子が配置されている部分を覆い表示内容が目視できる透明板と、この透明板の裏面に前記表示素子に隣接して設けられ音声発信機能を有する圧電振動素子とからなることを特徴とする。前記表示装置は、各種の液晶表示装置、プラズマ表示装置等のような平面タイプが望ましい。

【0006】また、前記透明板と圧電振動素子との間に振動特性を改善するために振動空間を設けるようにしてもよい。このようにすると、拡声器（スピーカー）の効果がある。さらに、前記透明板に複数の圧電振動素子を設けるようにしてもよい。この場合には、ステレオ効果が可能である。更に、前記透明板の一部を薄肉にして、この薄肉の部分に前記圧電振動素子を配置すると周波数特性が改善されて良い。

【0007】

【発明の実施の形態】以下、本発明の実施の形態を説明する。図 1 に示すものは、本発明を適用した携帯用電話機の正面図である。携帯用電話器 1 は、薄い略長方形をなし、合成樹脂製の電話器本体 2 から構成されており、この電話器本体 2 内には、電話の機能を実現する IC 等の電子機器が内装されている。電話器本体 2 は、2 体からなりその厚さ方向の中心の分割面で 2 分割される。

【0008】電話器本体 2 の上面にはケースカバー 3 が配置され、この裏面には裏面本体 4 が配置されている。ケースカバー 3 は、制御パネルの機能と電話器本体 2 としての機能の両方果たすものであり、このケースカバー 3 の下方には複数の押ボタン 5 が配置されキー群を構成する。このケースカバー 3 のフレームはマグネシウム合金等で作られている金属フレームである。この金属フレームは、IC 等の電子部品から発生する電磁波、または、他の電子機器等からの電磁波を効率良く遮断する効果があり、最近ではよく使用されている。

【0009】押ボタン 5 は、電話器本体 2 内に配置され

た接点類（図示せず）を駆動するための指令を与える。また、ケースカバー3の上方には矩形形状の窓部6が設けられ、この窓部6の内部方向に液晶表示素子7が内蔵され、その上部に透明板8が設けられている。この透明板8は、窓部6の縁に沿ってケースカバー3に重ねて、窓部6全体を覆うように形成されている。透明の板とすることで、液晶表示素子7の表示内容が、外部から目視できる。

【0010】液晶表示素子7は公知のもので、カラーまたはモノクロ表示機能を有するものである。透明板8は、液晶表示素子7の上方を覆っており、さらにケースカバー3の上端（アンテナ側）まで拡張している。透明板8は、ポリカーボネート樹脂板またはアクリル樹脂板等で作られたものである。

【0011】液晶表示素子7が配置された部分より上方の透明板8の裏面に圧電振動素子9が取り付けられている。この圧電振動素子9については、後で詳細に説明する。携帯用電話器1は、概略このような構成になっており、ケースカバー3と裏面本体4とは、ビス又はノッチ等の固定手段（図示せず）で一体に固定されている。

【0012】図2は、液晶表示素子7の部分と圧電振動素子9の部分的部分的に示した断面図である。液晶表示素子7は、ケースカバー3に内蔵されている回路基板10に取り付けられている。液晶表示素子7の表示内容は、この液晶表示素子7の表面に表示されるが、前述のとおり、透明板8を介してその表示内容を目視することはできる。また、圧電振動素子9は、拡張された透明板8の端部裏面に、図2で示すように液晶表示素子7と隣接して取り付けられている。

【0013】これをさらに詳細に示したのが図3である。圧電振動素子9は、圧電振動体として圧電性結晶11を使用している。圧電振動素子9は、モノモルフ型、積層型、バイモルフ型またはマルチモルフ型等と呼ばれているものであり、圧電効果を示す圧電性結晶11等からなるものである。この圧電振動素子9は、圧電体に対向する2つの電極12、13が設けられ、この2つの電極12、13間に電圧を印加することにより生ずる圧電歪みを利用し、機械的な振動の運動を行わせる素子である。

【0014】ただし、本実施の形態で使用する圧電振動素子9は、振動板を有していないものである。透明板8の端部8aは他の部分より薄肉に形成され、この裏面8bに圧電振動素子9が直接貼り付けられているので、周波数特性が良く振動板は必ずしも必要がない。また、透明板8の端部8aの表面に装飾のために塗装8cしても良い。透明板8は透明のために裏面8bに貼られた圧電振動素子9が透かして見える。これを防止するためと携帯用電話器1の美感を向上させるために、表面に塗装8cを施しても良い。

【0015】図に示す圧電振動素子9は、圧電性結晶1

1の一方の面が電極12となる銀ろう付けがなされており、また、この圧電性結晶11の裏面に当たる他方の面も電極13となる銀ろう付けがなされている。この銀ろう付けは薄い膜状になっている。この2つの電極12、13には、それぞれリード線14、15が接続される。2つの電極12、13の間に音声信号の電圧が印加されると、圧電性結晶11が屈曲変位を起し音声を発する。

【0016】一般にはこの素子を接着剤を介して薄い膜状に振動板に貼り付けられ、この貼り付けられたものをケースカバー等に取り付けるが、本発明の構成は、透明板8に接着剤16を介して圧電振動素子9を貼り付けている。この結果、透明板8が振動板となって音声を発するので、音声効果がよい。

【0017】即ち、透明板8は一般の場合の振動体に比べ音域面積を大きくとれるので、低音域を含め幅広い音声を得ることができる。このように、圧電振動素子9を直接透明板8に取り付ける構成にしたことで、音声効果を高めると共に組み立てが簡素化され、製造の上からは工数削減となり低コストになる。

【0018】図4は、圧電振動素子9を透明板8に貼り付ける際、透明板8との間に仕切壁17を付して空間部18を設けた構成のものである。この構成は、圧電振動素子9と透明板8との間に仕切壁17を介して空間部18を設ける。仕切壁17は周囲を囲む環状になったもので、圧電振動素子9側と透明板8とを接着剤19で接着されている。圧電振動素子9からの音響はこの空間部18を介して透明板8を響かせ一層効果的である。

【0019】また、透明板8には放音孔20を設け音を聞き取りやすくしている。透明板8に耳を当てて聞くと、ダンパー効果で聞きづらいおそれを考慮すれば、振動板を有する圧電振動素子9を取り付けてもよい。空間部18を設けることにより、共鳴する周波数を低くすることができ高音域側を抑制することが可能なので、聞き易くなる効果がある。ただし、放音孔20は、必ずしも配置する必要はない。

【0020】図5は、2つの圧電振動素子21を設けた例である。携帯用電話器1の多機能化により、最近は、インターネットの普及に伴い携帯用電話器1で音楽を聞くことも可能になっている。音響効果を高める意味でステレオ音が理想であるが、2つの圧電振動素子21を独立的に設けることにより可能である。透明板22の裏側に独立的に音を発生させる圧電振動素子21を2つ並列して取り付け。

【0021】透明板22には、2つの圧電振動素子21の位置に対応して放音孔23が設けられている。この放音孔23に耳を当てると、異なる音域の音を同時に聞くことができる。また、両耳で聞く場合は、イヤホーンを携帯用電話器1に取り付けるように構成して（図示せず）、このイヤホーンを介して聞くと、ラジオ等でステ

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レオ音を聞くのと同様なことが可能である。

【0022】液晶形の携帯電話器のように、機能部品の多く取り付けられスペースの限られた場合に本発明の適用は有効である。狭いスペースに、携帯電話器のケースの形状に合わせて取り付けることが可能である。このように構成することにより、大きな発音が可能となる。

【0023】このように本発明は、多様な製品形態に対応できるので、以上説明した構成に限定されるものではなく、他の例にも適用されることはいうまでもない。たとえば、圧電発音体の形状、透明板の形状は矩形状に限らず円形状のものであってもよくその形状に限定されない。

【0024】

【発明の効果】以上詳記したように、本発明を適用することにより、圧電振動素子の音声効果がよくなり、スペースの有効利用を図り、低コストを実現することができた。

【図面の簡単な説明】

【図1】図1は、本発明を適用した携帯電話器の正面図*

*である。

【図2】図2は、圧電振動素子を透明板の裏側に取り付けたことを示す部分断面図である。

【図3】図3は、図2の詳細図である。

【図4】図4は、圧電振動素子と透明板との間に空間部を設けた圧電振動素子取り付けの例を示した断面図である。

【図5】図5は、2つの圧電振動素子を設けた携帯電話器の正面図である。

【符号の説明】

1…携帯電話器

3…ケースカバー

6…窓部

7…液晶表示素子

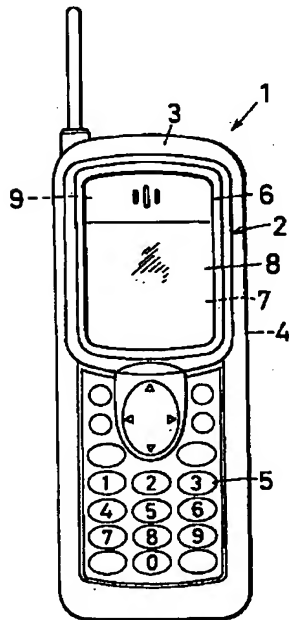
8、22…透明板

9、21…圧電振動素子

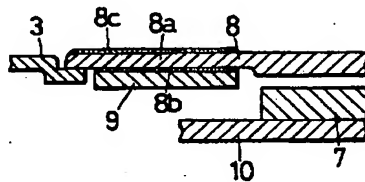
18…空間部

20、23…放音孔

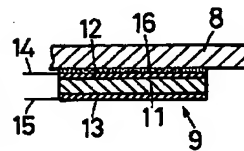
【図1】



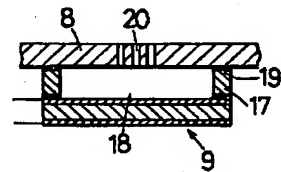
【図2】



【図3】



【図4】



【図5】

